

ABSTRACT

Optoelectronic devices of the present invention include several embodiments of an electronically active optical waveguide made of a strip loaded waveguide with a lateral, self-aligned diode fabricated in a layer of silicon. A voltage applied across the diode changes the free carrier density in a portion of the active waveguide, which can change the refractive index in that portion of the waveguide. Changing the refractive index can cause a phase shift of an optical signal propagating down the waveguide and this effect can be used to control the optical signal. Changing the free carrier density can also change the amount of optical attenuation in a section of an active waveguide.

Optoelectronic devices such as: modulators, attenuators, switches, beam diverters, tunable filters and other devices can be fabricated on a standard SOI substrate (silicon on insulator), which is typically used in the fabrication of CMOS integrated circuits. Other types of substrates can also be used for the fabrication of optoelectronic devices of the present invention.